SHOUT
SHARE
IT

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

U. S. DEPARTMENT OF AGRICULTURE
BIOLOGICAL SURVEY—BULLETIN No. 22
C HART MERRIAM, *Chief*

# BIRDS KNOWN TO EAT THE BOLL WEEVIL

BY

VERNON BAILEY
CHIEF FIELD NATURALIST, BIOLOGICAL SURVEY

LIBRARY
RECEIVED
NOV 1 1905
U. S. Department of Agriculture

WASHINGTON
GOVERNMENT PRINTING OFFICE
1905

U. S. DEPARTMENT OF AGRICULTURE
BIOLOGICAL SURVEY—BULLETIN No. 22
C. HART MERRIAM, *Chief*

# BIRDS KNOWN TO EAT THE BOLL WEEVIL

BY

VERNON BAILEY
CHIEF FIELD NATURALIST, BIOLOGICAL SURVEY

WASHINGTON
GOVERNMENT PRINTING OFFICE
1905

# LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Biological Survey,
*Washington, D. C., July 25, 1905.*

Sir: I have the honor to transmit herewith for publication as Bulletin No. 22 of the Biological Survey a preliminary report upon birds in their relation to the boll weevil, by Vernon Bailey. In view of the fact that this destructive insect continues to extend its range into unoccupied cotton regions, it is obvious that no factor in the warfare against it can safely be neglected. The relation of birds to the boll weevil and the extent of dependence that can be placed upon the former in limiting its inroads are not well understood. As requests from the cotton districts for information upon the subject have been many and urgent, field investigations, of which the present bulletin is the first outcome, are now being conducted by the Biological Survey, with a view to ascertaining the particular birds which perform the most important service in preying upon the weevil, to the end that special protection be extended to such species.

Respectfully,

A. K. Fisher,
*Acting Chief, Biological Survey.*

Hon. James Wilson,
*Secretary of Agriculture.*

# CONTENTS.


| | Page. |
|---|---|
| Introduction | 7 |
| Field notes | 8 |
| Condition of cotton fields during investigations | 12 |
| Conditions of bird life during investigations | 13 |
| Decrease in number of weevils | 13 |
| Examination of bird stomachs | 14 |
| Investigations by Bureau of Entomology | 14 |
| Conclusions and recommendations | 14 |
| List of birds which had eaten boll weevils | 16 |

# BIRDS KNOWN TO EAT THE BOLL WEEVIL.

## INTRODUCTION.

For several years past the cotton growers of Texas, as is well known, have sustained enormous losses through the ravages of cotton boll weevils. Remedial measures of various kinds have been tried, but, though some of these undoubtedly have proved more or less effective, the number of insects does not seem to have been materially reduced, and their progress into other cotton-producing districts has been steady, the borders of their range widening yearly.

The extent to which the native birds feed upon this, one of the most destructive insect pests that have ever appeared in the United States, is yet but imperfectly understood, and investigations are now being conducted by the Biological Survey with a view to determining just what species feed upon the weevil and the extent to which it enters into the fare of each.

The fact that for the past twelve years the weevil has been steadily spreading over the cotton-producing area forbids the assumption that birds are likely ever to exterminate the insects. Nevertheless, as will appear from facts presented below, certain species prey upon the weevil to a greater or less extent, and it is probable that by carefully protecting such species and by encouraging their increase the good work they now do may be greatly augmented in the future. Thus, the question of extermination aside, birds are likely to prove an effective ally in checking the increase of the pest. The fact that other species of weevils are a favorite diet with many of our insectivorous birds has been proved by previous investigations.[a] Moreover, it is well known that when a new insect first appears in a district birds are somewhat slow in acquiring a taste for it and in sufficiently learning its haunts and hiding places to effectively pursue and capture it. It is probable, therefore, that some birds which at present are not known to attack the weevil at all will later acquire a taste for it, and that others which now feed upon it sparingly will in future feed upon it to a greater extent.

The present report is in response to urgent appeals from the

[a] Food of Bobolink, Blackbirds, and Grackles, by F. E. L. Beal, Biological Survey Bulletin No. 13, pp. 22, 44, 52, 69, and 189.

infested and threatened cotton districts for reliable information as to the species of birds which feed upon the boll weevil. Field work for the purpose of obtaining this information was begun at Seguin, Guadalupe County, in southern Texas, October 31, 1904, and was carried on at several localities in the boll weevil district until December 16. Investigations now in progress in the field and laboratory will cover the remainder of the year, including the season of greatest abundance and activity of the weevils, and will furnish material for more general and definite conclusions.

In the course of their investigations of the boll weevil the Entomologists of the Department examined the stomachs of a large number of birds collected in and around the cotton fields, and the results appear in Bulletin 51 of the Bureau of Entomology, on the Mexican Cotton Boll Weevil. These results have been tabulated and appear in the summary of the present report.

## FIELD NOTES.

The following field notes relate only to the birds found to have eaten boll weevils.

**Carolina wren** (*Thryothorus ludovicianus*).—Carolina wrens were common at Columbus, Eagle Lake, and Wharton, were fairly abundant at Navasota, and a few were seen at Seguin. They were rarely found in the fields, but were constantly dodging in and out of the brush heaps, log piles, and vine tangles, running over the rough bark of old trunks and roots and logs, peeking and peering and picking in all of the dark corners overlooked by larger species, and even hunting among the dry leaves on the ground under logs and brush. They were generally in pairs, and sometimes two pairs were found in one brush heap, while almost every thicket or vine tangle contained one or several of the birds. Those observed were apparently permanent residents. Seven were shot, 5 of which had eaten boll weevils for breakfast, and one of these had eaten 2, making 6 weevils to 7 birds at one meal. As all but one of the birds were taken after the frosts, there is no reason to doubt that the good work of this species goes on throughout the winter.

**Titlark, Pipit** (*Anthus pensilvanicus*).—Titlarks were first seen at Columbus, November 14, and this evidently was about their first appearance. Large flocks were seen in the cotton fields the next day, and at Eagle Lake and Wharton a few days later. At Navasota they were still numerous in flocks of 100 or more at the time of my departure, December 16. At Wharton and Eagle Lake, where most of the birds were collected, flocks of 100 to 500 were constantly in the cotton fields, seeking food as they ran or walked over the ground. When flushed they flew to another part of the field or to a neighboring field, disappearing among the cotton stalks. The eight indi-

viduals shot contained remains of five boll weevils. Allowing the birds only two meals a day, at this rate they would consume 125 per cent of their own numbers in boll weevils daily. Considering the abundance of these birds, none of the other species collected equal them as weevil destroyers, at least at this particular season.

It is perhaps of interest to add that the titlarks breed in great numbers above timber line in the high mountains of New Mexico, Colorado, and northward, and winter in still greater numbers in southern Texas.

**Black-crested titmouse, Tomtit** (*Bæolophus atricristatus*).—Tomtits were fairly common at Seguin and Navasota, in their usual resident numbers. They hunt mainly over the branches and trunks of the trees, where they pry into all the cracks and crevices of bark and broken wood. Only 2 were shot, 1 of which had eaten a boll weevil.

**Western meadow lark** (*Sturnella magna neglecta*).—The western meadow larks were seen from the train between Austin and San Antonio, October 28, rising in flocks of 10 to 100 from almost every cotton field along the railroad. In one field of not more than 20 acres 108 birds were counted. At Seguin they were abundant from October 31 to November 12, and at Eagle Lake they were common to November 19 over the open country, or, sometimes, in company with the more common Florida form, *argutula*, in the fields. At Navasota they were still abundant on the open prairie and in fields up to December 16, but less common in the fields and wooded country than *argutula*. These dates merely indicate that the meadow larks had arrived in full force from the north before my arrival in the field and remained in undiminished numbers to the time of my departure after the middle of December. The greater number of those sent in for examination were shot from November 1 to 12 at Seguin, where only *neglecta* was found. Here it was one of the most abundant birds in the fields. In walking across a 40-acre cotton field I usually flushed 200 or 300 western meadow larks. In corn and sorghum fields the birds were just as common, but as fully three-fourths of the fields in this region are devoted to cotton the greater numbers of birds were found in the cotton fields. The open nature of these fields, with the partial concealment and protection offered by the rows of cotton stalks, makes them favorite feeding ground for the larks.

The 18 boll weevils eaten by the 64 birds probably represent a fair average of the number of weevils eaten at one meal at this season. Allowing the birds at least two meals a day, the birds safely may be assumed to destroy over 50 percent of their own number in weevils daily. This good work carried on throughout the fall and winter months can not fail to have an important effect on the next year's crop of weevils.

**Florida meadow lark** (*Sturnella magna argutula*).—The Florida meadow larks were first found at Eagle Lake, November 18, where they were more numerous than *neglecta*, with which they were associated in the cotton fields. At Wharton they were common and the only form found. By the nature of the country they were restricted to the large cotton and cane fields which occupy the only clearings in the heavy forest; and until the sugar cane is cut, usually late in November, the larks were practically restricted to the cotton fields. At Navasota they were common up to my departure, December 16, and their favorite resorts were the cotton and corn fields of the timbered river bottoms. Here the western meadow lark was associated with them to some extent, but seemed to prefer the open prairie strips of this half-forested region. In abundance and habits the Florida form does not differ greatly from the western meadow lark, and the conclusions in regard to one would apply in a general way to both. The slightly smaller proportion of boll weevils eaten by *argutula* is probably due to the fact that the specimens were collected later in the season.

**Common phœbe** (*Sayornis phœbe*).—The common phœbe was the only member of the flycatcher group seen, and it was common at every locality visited from November 1 to December 16. It is a winter resident only in this part of Texas, arriving usually in October and remaining till April. As it did not diminish in numbers up to the middle of December, it evidently remains in full force throughout the winter. It frequents brushy and open country and is often found during feeding hours sitting on top of a cotton plant or cornstalk out in a field. In walking across a cotton field half a dozen birds were sometimes seen. Most of their food was taken on the wing, but they often dived to the ground in pursuit of insects. The fact that 2 out of 10 birds had eaten boll weevils suggests that the several other species of flycatchers which spend the summer in the boll-weevil region may do important service in snapping up weevils on the wing during the period of greatest activity of the insect.

**Redwing blackbird** (*Agelaius phœniceus*).—A few redwing blackbirds were found at Seguin November 7; two days later several small flocks were seen; and by the 12th they were fairly common in flocks of 20 to 50. At Columbus a few were shot from a flock of 100 or more in a cotton field November 15, and other large flocks were seen. At Eagle Lake, on the edge of the prairie, November 16 to 19, the redwings in flocks were innumerable, and I could only estimate them at hundreds of thousands of individuals. Numbers of cowbirds were in these flocks, but most of them were redwings. At a distance the flocks looked like clouds of smoke, but nearer, as they rose and wheeled and circled over the fields, they suggested rapidly moving clouds or dust in the desert. As they settled down, they blackened

the stacks of rice straw, fences, and trees, or disappeared in the rice stubble or fields of weeds. Those in the cotton fields were lighting on the trees and tall weeds along the fence rows and making side trips in squads of 1,000 or so to different parts of the fields. As these flocks settled among the cotton stalks, it was probably mainly for grass and weed seeds, which with broken rice comprised the contents of most of the crops and gizzards, but the fact that 2 out of the 27 individuals shot had eaten boll weevils is of some significance in consideration of the vast numbers of the birds.

**Western savanna sparrow** (*Passerculus sandwichensis alaudinus*).—Western savanna sparrows were abundant at all of the localities visited during the time of my stay in Texas. They are so small and inconspicuous as to escape general notice, but as I walked through the cotton fields they were constantly darting out from before me, running to right and left to avoid flight, or flying a short distance and dropping again into the grass. Out of 18 shot only 1 was found to have eaten a boll weevil, so the importance of the species is not great, even considering the abundance of the individuals.

**White-throated sparrow** (*Zonotrichia albicollis*).—White-throated sparrows were first seen at Eagle Lake November 16, where they took the place of the white-crowned sparrow found at Seguin. They were common at Wharton and extremely numerous at Navasota up to the close of my work. Their favorite feeding grounds were in the thickets and brushy borders of fields, where they were constantly rustling among the weeds and leaves in search of food. Of the 9 specimens collected only 1 had eaten a boll weevil.

**Brown thrasher** (*Toxostoma rufum*).—One brown thrasher was seen at Columbus November 15 and one at Wharton November 17. A few were seen at Liberty November 21, and they were common throughout the Big Thicket country near Saratoga and at Navasota up to December 16. At Navasota, where all of the specimens were procured, December 10 to 15, they were fairly abundant in the thickets and brush rows around the edges of fields. Individuals were easily located at some distance by the noise they made scratching and running among the dry leaves, and a good many were shot in the hope that they were unearthing and eating boll weevils. Of the 28 specimens, however, but 1 had eaten a boll weevil.

**Texas bobwhite** (*Colinus virginianus texanus*).—Thirty-five specimens of Texas bobwhite were collected at Seguin between November 2 and 12, where at the opening of the hunting season they were abundant. Later a few flocks were seen at or near Columbus, Eagle Lake, Wharton, and Navasota, but at all of these places they were comparatively scarce and the flocks were scattered and wild. At Seguin almost every field and pasture contained one to three coveys of 10 to 20 quail, which were generally to be found not far from their

chosen roosting thickets or feeding grounds. On many of the farms one or more flocks had taken up quarters close to the houses or in the orchard or garden and had become comparatively tame. At Mr. Neel's place, where most of my work was done, a flock of about a dozen birds lived in the orchard, garden, and barnyard, and when frightened rarely flew beyond these limits. The farthest from the house that I ever found them was in the edge of the adjoining cotton field, where toward sundown they were often seen feeding. Mr. Neel called my attention to the fact that about one-third more cotton had been gathered from the part of the field near the house, where his 100 chickens and these quail habitually fed during the summer, than over the rest of the field. At the farther end of this field another flock of 8 or 10 quail lived in the mesquite brush and made daily rounds out into the field to feed. The birds were shot in other fields farther from the house, and in all cases either out in the fields, where they were usually found feeding during the morning and evening hours, or in the brush along the edges of the fields, where they roosted at night and were generally found during the middle of the day.

The fact that at this time the quail were feeding almost exclusively on weed seeds was evidently due to the great abundance of freshly ripened seeds. During the summer months the quail, especially the young, are known to feed to a much greater extent on insect food, and it is reasonable to expect that later in the season, especially during the winter and spring months, after the weevils have left the cotton, the quail scratch them up from under leaves and rubbish.

### CONDITION OF COTTON FIELDS DURING INVESTIGATIONS.

At the beginning of the field work at Seguin, October 31, 1904, cotton picking was just completed; but owing to recent rains a second crop of leaves, buds, and young bolls had started on the tops of the cotton plants, and the weevils were actively engaged in feeding on the buds or young bolls within the cover of the closed squares. The weevils apparently were less abundant than during the summer months, and as their breeding season seemed to have closed they were probably also less active. Otherwise, the conditions so far as related to the weevils were essentially the same as in summer. These conditions were unchanged up to November 12, when the first hard frost of the season occurred over most of southern Texas, including Seguin, where investigations were in progress at the time. Most of the cotton was killed, and by the third day the weevils had left the dead and dried-up cotton tops and disappeared. Still, a few fields or parts of fields escaped the frost, and from November 13 to 20, in the vicinity of Columbus, Eagle Lake, and Wharton, a large number of birds were shot in and around these fields to determine whether they were

eating more than the usual number of weevils, as the insects were driven from the cover of the protecting bracts and forced to seek winter quarters.

Still later, at Navasota, December 10 to 16, long after all the cotton had been killed and dried up and the weevils forced to seek winter quarters, 100 birds were collected, mainly in woods, brush, and weed patches surrounding the cotton fields. As no boll weevils could be found in the cotton fields at this time it is fair to assume that they had gone into winter quarters. Such, briefly, was the status of the cotton fields in relation to the weevils during the investigations.

## CONDITIONS OF BIRD LIFE DURING INVESTIGATIONS.

At the several localities the species of birds inhabiting the cotton fields varied from time to time. At Seguin western species predominated, while at Wharton and Navasota mainly eastern birds were found. During the time covered by the investigations the resident summer birds were leaving and the winter species were arriving. Many of the insectivorous summer residents, such as orioles, flycatchers, swallows, martins, night-hawks, and whip-poor-wills, had disappeared when the work began, and their places were filled by numerous seed-eating migrants of the sparrow family. Moreover, the well-known change of food habits of resident species, like the quail, which are largely insectivorous during the summer and mainly seed-eating during the fall and winter, when the present investigations were chiefly made, must be taken into account in estimating their value as destroyers of weevils.

## DECREASE IN NUMBER OF WEEVILS.

Of the 354 birds killed, approximately 10 per cent had eaten boll weevils. Examination of the stomachs collected at different dates shows a slight decrease in the number of weevils eaten as the season advanced. In round numbers, those eaten during the period of green cotton, October 31 to November 12, were 11 per cent of the number of birds killed; for the period of change from green to dry after the first hard frost, November 13 to 20, 10 per cent of the number of birds; for the period of dry cotton after the disappearance of the weevils, December 10 to 16, 8 per cent. The fact, as stated above, that fewer weevils appear in the stomachs of birds shot during the later period than in the earlier one, is evidently due to the diminished supply of weevils.

Out of the 38 species of birds collected which had not eaten boll weevils, 17 species were represented by only 1 specimen each, hence the negative evidence in regard to these is of little significance. If greater numbers of the same species had been collected or if they had

been collected at another season they might appear among the number of enemies of the weevil.

## EXAMINATION OF BIRD STOMACHS.

It being found impracticable in the field to determine with any degree of certainty whether or not the birds had eaten boll weevils, all stomachs were preserved and sent to Washington, where they were examined and the boll weevils identified by Prof. F. E. L. Beal, of the Biological Survey.

## INVESTIGATIONS BY BUREAU OF ENTOMOLOGY.

In Bulletin No. 51, published by the Bureau of Entomology, on the Mexican Cotton Boll Weevil, are given the results of the examination by Mr. E. A. Schwarz of the stomachs of 17 species of birds. These birds are added to the list presented below, and indicated by stars, and the data are utilized in the general conclusions. Except those of the mourning doves and quail, the stomachs were taken from birds collected at Victoria, Tex., and of these "100 were obtained during the last week of February, 7 during June, 3 during July, 26 during August, and 380 between September and December."[a]

Out of the 17 species of birds, 11 species had eaten boll weevils, as appears in the following table. These 11 species comprised 237 individuals, of which 44 individuals had eaten boll weevils. The 6 species of birds that had not eaten weevils were mourning dove, quail, redwing blackbird, lark sparrow, grassfinch, and blue-gray gnatcatcher.

Eliminating the mourning doves, which practically never eat insects, and the quail, which eat very few at the season when these were collected (November), there remains a total of 255 bird stomachs examined, of which 44 contained boll weevils.

## CONCLUSIONS AND RECOMMENDATIONS.

The total number of stomachs examined in the Biological Survey and Bureau of Entomology, aside from mourning doves and quail, was 570. Of these, 78, or 13.6 per cent, contained boll weevils. The total number of weevils eaten by 78 birds was 101, or 17.7 per cent of the total number of stomachs.

With reference to the comparatively small number of cotton boll weevils eaten by any of the birds examined it should be borne in mind that during the time when most of the birds were collected adult weevils were not numerous. During the earlier period of the field work (October 31 to November 12) the insects were practically

[a] The Mexican Cotton Boll Weevil, by W. D. Hunter and W. E. Hinds, Bulletin No. 51, Bureau of Entomology, Department of Agriculture, 1905, p. 151.

all within the squares on the green cotton plants, and it was a simple matter to examine the squares and locate all the weevils along a cotton row. This was done again and again in order that their numbers could be estimated, and in no case did they average more than one to a hill of cotton, and rarely more than one to three hills. Thus as the number of weevils consumed in a field equals 17.7 per cent of the number of birds occupying that field per day, or, by allowing the birds two meals a day, 35.5 per cent of their number, the destruction of weevils is after all comparatively rapid; but as this ratio depends largely on the abundance of the weevils—the more numerous the weevils naturally the greater the number eaten—their complete extermination by birds is hardly to be expected. It is impossible to learn just how many times a day a bird's stomach is filled and emptied, but it is well known that birds with crops fill both crop and stomach twice a day. Most insectivorous birds are without crops, however, and as they usually feed more or less continuously from early morning to evening it is not improbable that the stomach is filled and emptied five or six times daily. As examinations of bird stomachs are based upon only a small portion of the day's food, the number of weevils detected is probably far less than are actually destroyed daily. Even the incomplete data thus far obtained, however, suggest that without the aid of the birds no cotton can be raised in the weevil-infested area.

Until two years ago the protection afforded birds by law in the State of Texas was very inadequate, and many of the most important insectivorous species were slaughtered for sport or for their plumage. Thus their numbers were greatly reduced and some kinds were nearly exterminated. In 1903 a State law was passed providing for the protection of all nongame birds and fixing a close season for turkeys, grouse, quail, and doves, but giving no protection to killdeer, plover, snipe, and many other insectivorous shore birds which are now legitimate game at all seasons. The law in respect to the shore birds should be changed, since it is known that at least one species of plover, the killdeer, feeds upon cotton boll weevils to a greater or less extent, one of the two specimens examined having eaten three adult insects. The fact that the killdeer remains in and about the cotton fields the year through emphasizes the importance not only of extending protection to this particular bird at all seasons, but of protecting as well the other plovers and shore birds which have similar insectivorous habits. The desirability of such protection is emphasized by the fact that formerly the upland plover, one of the most insectivorous of all species, abounded on the Texas prairies. It was, however, slaughtered by the wagon load for market, and now where it once swarmed it is comparatively rare. It is highly probable that this species would lend efficient aid in the warfare against the weevil

were it permitted to winter unmolested within the borders of the State. Moreover, the present law protecting the nongame birds, such as meadow larks, grackles, orioles, and flycatchers, is to no small extent disregarded, and many of the most beneficial birds are being destroyed. An efficient warden service would no doubt aid in preserving the birds, but the bird laws of a State can be made really effective only when supported by public sentiment, prompted by a widespread knowledge and appreciation of the services birds render to man. When the value of these services in the present war against the boll weevil is understood throughout the cotton States it must result in an enlightened public sentiment in favor of the birds.

The necessity of extending every possible protection and encouragement to insectivorous birds within the cotton-producing districts of Texas and other Southern States is strongly urged.

## LIST OF BIRDS WHICH HAD EATEN BOLL WEEVILS.

| Species. | Number of birds examined. | Number that had eaten boll weevils. | Number of boll weevils eaten. | Species. | Number of birds examined. | Number that had eaten boll weevils. | Number of boll weevils eaten. |
|---|---|---|---|---|---|---|---|
| Carolina wren | 7 | 5 | 6 | *Brewer blackbird | 10 | 5 | 11 |
| Titlark, Pipit | 8 | 4 | 5 | *Cowbird | 31 | 4 | 4 |
| Tomtit, Black-crested titmouse | 2 | 1 | 1 | *Jackdaw, Great-tailed grackle | 10 | 2 | 2 |
| Western meadow lark | 64 | 12 | 18 | *Western meadow lark | 153 | 23 | 26 |
| Florida meadow lark | 30 | 5 | 6 | *Mockingbird | 17 | 3 | 3 |
| Common phœbe | 10 | 2 | 2 | *Butcherbird | 7 | 2 | 5 |
| Redwing blackbird | 27 | 2 | 2 | *Killdeer | 2 | 1 | 3 |
| White-throated sparrow | 9 | 1 | 1 | *Baltimore oriole | 3 | 1 | 1 |
| | | | | *Dickcissel | 1 | 1 | 1 |
| Western savanna sparrow | 18 | 1 | 1 | *Scissor-tail flycatcher | 1 | 1 | 1 |
| | | | | *Common phœbe | 2 | 1 | 1 |
| Brown thrasher | 28 | 1 | 1 | Total | 475 | 79 | 102 |
| Texas bobwhite | 35 | 1 | 1 | | | | |

* Examined by Mr. E. A. Schwarz. See Bulletin 51, Bureau of Entomology, 1905.

O